

# Work Order ID 62841

October 12, 2010 7:22:17 AM



Page 1

Item ID: D212-664-207

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00



Cust Item ID:

Required Date: 10/22/10 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D212-664-247	Rev B								

100

0.00



DC

Document Control

DOCUMENT CONTROL

Memo

0.00

Photocopy bluefile and create labels as per PPP D212-664-207 CHG001

Siolubog

CR for BG 10/11/02

110

0.00



Packaging

Packaging

Pick Kit

Packaging

Memo

0.00

EL 10-10-12 (X)

120

0.00



CNC Bend 2

CNC Alpha 160 Bender

BENDING MACHINE - CROSSTUBES

Memo

0.00

Bend tube as per Dwg D212-664-247 using CNC bender program and Folio FT

EL 10-10-12 (X)

Pho

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D212-604-207 PAR #: \_\_\_\_\_ Fault Category: x-tubes NCR: Yes No DQA: ✓ Date: 10/16/09  
 Resolution: re-work Disposition: rework QA: N/C Closed: ✓ Date: 10/16/10

NCR: <u>62841</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
10.10.12	140	One hole in cuff ovalized during drilling b.c. Process.	<u>JP</u> 10.10.12 08/042	SCRAP & REPLACE D3662-1 CUFF.	<u>TL</u> 10/10/12	<u>S</u> 10/10/12	<u>JP</u> 10.10.12 08/042	<u>S</u> 10/10/12

NOTE: Date & initial all entries

**Work Order ID 62841**

October 12, 2010 7:22:17 AM

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Item ID: D212-664-207

Accept

Setup Start

Revision ID:

Stop

Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00

Required Date: 10/22/10 Req'd Qty: 1.00

Cust Item ID:

Customer:

Reference:

Run Start

Approvals: Process Plan: Date:

Tooling: Date:

QC: Date:

SPC (Y/N): Date:

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

130

QC15- Crosstube Dimensional Check

0.00

QC

Memo

0.00

Quality Control

8/10/12

C

140

Crosstubes

0.00

Crosstubes

Memo

0.00

Crosstubes

1-Drill Rivet holes as per Dwg D212-664-247 using DT8972.\*\*\*Use T-Pin\*\*\*

2-Drill pilot holes in tube as per Dwg D212-664-247 using DT8550 and DT8551

3-Ream hole to finish size in tube as per Dwg D212-664-247

4-Deburr &amp; Inspect for surface damage. Repair damage within limits as per Dwg D212-664-247

5-Scribe part # and batch # using vibrating stylus as per Dwg D212-664-247

SADIEL  
10-10-13

①

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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**NOTE:** Date & initial all entries

**Work Order ID 62841**

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Item ID: D212-664-207

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Revision ID:

Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00

Required Date: 10/22/10 Req'd Qty: 1.00

Reference:

Cust Item ID:

Customer:

Approvals: Process Plan: Date:

Tooling:

Date:

QC: Date:

SPC (Y/N):

Date:

Run Start

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

150



HandFXtube

Hand Finishing Crosstubes

Crosstubes Chemical Conversion

Memo

Chemical Conversion Coat Tube &amp; Cuffs

0.00

0.00

SAD  
10-10-13

(1)

160



QC

Quality Control

QC3- Inspect Part Finish

Memo

0.00

0.00

8/10/10/13

170



QC

Quality Control

QC5- Inspect part completeness to step on W/O

Memo

0.00

0.00

8/10/10/13

(70)

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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**NOTE:** Date & initial all entries

**Work Order ID 62841**

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Item ID: D212-664-207

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Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00

Cust Item ID:

Required Date: 10/22/10 Req'd Qty: 1.00

Customer:

Reference:

Run Start

Approvals: Process Plan: Date: Tooling: Date:

Stop

QC: Date: SPC (Y/N): Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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180

Outsource process - NDT per QSI038 4.1

0.00



Outsource2

Memo

0.00

Outsource process - NDT

Liquid Penetrant Inspection as per QSI 038  
Issue P/O: 12740 LPI as per ASTM 1417  
Level 2 Attach copy of NDT results to work order

CL 10/10/14 ①

190

Receive &amp; Inspect for Damage &amp; Mat'l Certs

0.00



Packaging

Packaging

Memo

0.00

Packaging

Ensure copy of NDT results attached to work order.

CL 10/14/14 ①

200

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

Inspect for damage &amp; ensure results are as per Dwg D212-664-207

CL 10-20-14 ①

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Reference:

Approvals: Process Plan: Date: Tooling:

QC: Date: SPC (Y/N):

Cust Item ID:

Customer:

Run Start

Stop

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

210



Crosstubes

Crosstubes

Crosstubes

Memo

1-Rivet and assemble Cuffs with T-Pin in the through bolt holes as per Dwg D212-664-247. with Sika flex in Between tube & Cuff

A/R SIKAFLEX -241/-291 BATCH: ~~115114~~ 115114

0.00

0.00

215



QC

Quality Control

QC5- Inspect part completeness to step on W/O

0.00

Memo

\*\*\*Inspect cuff with T-Pin\*\*\*

0.00

8/10/10

(40)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**Work Order ID 62841**

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Item ID: D212-664-207

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Setup Start



Revision ID:

Stop



Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00



Cust Item ID:

Required Date: 10/22/10 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Stop



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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220



SprayPaint

Spray Painting

Spray Painting per QSI005 4.2

0.00

SprayPaint

Memo

0.00

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

PRIME:

Start Time: 10:00

Finish Time: 10:30

PAINT:

Start Time: 2:30

Finish Time: 3:00

ml 10 11 04 ①

230



QC

Quality Control

QC14- Inspect Spray Paint

0.00

Memo

0.00

Wrap in plastic bag to protect from scratches

4T 10-11-05

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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**Work Order ID 62841**

October 12, 2010 7:22:31 AM

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Item ID: D212-664-207

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Setup Start

Revision ID:

Stop

Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00

Required Date: 10/22/10 Req'd Qty: 1.00

Cust Item ID:

Customer:

Reference:

Approvals: Process Plan: Date: Tooling: Date:

Run Start

QC: Date: SPC (Y/N): Date:

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

240

0.00



Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1- Assemble as per Dwg D212-664-247

2- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

3- Instal support with magnobond 6398 per dwg D212-664-247, cure for 12hrs before packaging.

Time &amp; date of application: 10/13/10

Batch: 115580

EXP. DATE 07/2011

Torque: ml 10/11/08 ①

250

0.00



QC

Quality Control

QC5- Inspect part completeness to step on W/O

Memo

0.00

Scrubbed

①

# Work Order ID 62841

October 12, 2010 7:22:31 AM

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Item ID: D212-664-207

Accept

Revision ID:

Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00

Required Date: 10/22/10 Req'd Qty: 1.00

Reference:

Cust Item ID:

Customer:

Approvals:

Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run

Start

Stop

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

255

Pick Kit

0.00



Packaging

Memo

0.00

Packaging

10/11/10

260

QC4- 100% Inspect kits for completeness

0.00



QC

Memo

0.00

Quality Control

8/10/10/08

(H)

270

Packaging

0.00



Packaging

Memo

0.00

Packaging

Identify and pack for shipping as per PPP D212-664-207

Reva

hocs

10/14/10

# Work Order ID 62841

October 12, 2010 7:22:36 AM



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Item ID: D212-664-207

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00



Cust Item ID:

Required Date: 10/22/10 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Stop



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

280

QC21- Final Inspection - Work Order Release

0.00



QC

Memo

0.00

Quality Control

ck 10/11/09

mf

10-11-9

October 12, 2010 7:22:14 AM

**Parent Item:** D212-664-207




**Parent Item Name:** Crosstube Low Standard Aft

**Start Date:** 10/13/10**Required Date:** 10/22/10

**Start Qty: 1.00**

**Required Qty: 1.00**

**Comments:** IPP Rev:A New Issue 07.09.12 EC verified by: JLM  
 IPP Rev:B ECN 1100p 08-01-11 DD verified by: EC  
 IPP Rev:C ECN 1121 08-02-25 DD verified by: eC  
 IPP Rev: D QC5 replaced by QC15 at step 5 KJ Verified by: ec

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D212-664- 207TRNRevA		Manufactured	No			110	Each	0.0000	1	1			
 <span style="margin-left: 200px;">B60463</span> <span style="float: right;">10-10-12 EL</span>													
Crosstube Turning Detail													
D3660-1		Manufactured	No			140	Each	6.0000	2	2			
 <span style="float: right;">SAP 10-12-10</span>													
CUFF													
				<u>Location</u>					<u>Loc Qty</u>				
				ST477					6				
					53501				6				
CR3212-4-06		Purchased	No			220	Each	1,177.000	44	44			
 <span style="float: right;">3 EL 10-10-12 m/l 10-10-03</span>													
CHERRY RIVET													
				<u>Location</u>					<u>Loc Qty</u>				
				ST311					1177				
					112492				156				
					112612				21				
					112724				200				
					112794				800				



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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**NOTE:** Date & initial all entries

# Picklist Print

October 12, 2010 7:22:15 AM

Page 2

Work Order ID: 62841

Parent Item: D212-664-207

Parent Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10

Required Date: 10/22/10

Start Qty: 1.00

Required Qty: 1.00

D3595-063-530

Manufactured No

240

Each

73.0000

4

4



RUBBER CUSHION



*MM 10.11.05*

Location

Loc Qty

Loc Code

FP

36

50030

12

51776

24

LG

37

59581

37

D2940-1

Manufactured No

240

Each

37.0000

2

2



Support



*MM 10.11.05*

Location

Loc Qty

Loc Code

LG

37

45203

1

57338

16

60271

20

MS21920-28

Purchased No

240

Each

65.0000

4

4



Clamp(per MIL-DTL-8783C)



*MM 10.11.05*

Location

Loc Qty

Loc Code

FG

5

105884

5

LG

50

112863

12

114749

48

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Shop Packet Print

Page 2

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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October 12, 2010 7:22:15 AM

Page 3

Work Order ID: 62841

Parent Item: D212-664-207

Parent Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10

Required Date: 10/22/10

Start Qty: 1.00

Required Qty: 1.00

D3428-1

Manufactured No

255

Each

8.0000

1

1

  
Placard



10/11/10

Location

Loc Qty

Loc Code

ST096

8

62096

8

MS21042L6

Purchased

No

255

Each

240.0000

6

6

  
Nut



10/11/10

Location

Loc Qty

Loc Code

ST300

240

111578

4

114495

36

115300

200

AN960JD616

NAS1149D0663J

Purchased

No

255

Each

0.0000

18

18

  
Washer



11/15/10 10/11/10

AN6-40A

Purchased

No

255

Each

87.0000

4

4

  
Bolt



10/11/10

Location

Loc Qty

Loc Code

ST343

87

112828

1

114283

26

115300

60

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Shop Packet Print

Page 3

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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# Picklist Print

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October 12, 2010 7:22:16 AM

Work Order ID: 62841

Parent Item: D212-664-207

Parent Item Name: Crosstube Low Standard Aft



Start Date: 10/13/10

Required Date: 10/22/10

Start Qty: 1.00

Required Qty: 1.00

AN6-41A

Purchased

No

255

Each

62.0000

2

2



*Notes*

Bolt

Location

Loc Qty

Loc Code

ST344

62

113288

32

115316

30

*2*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

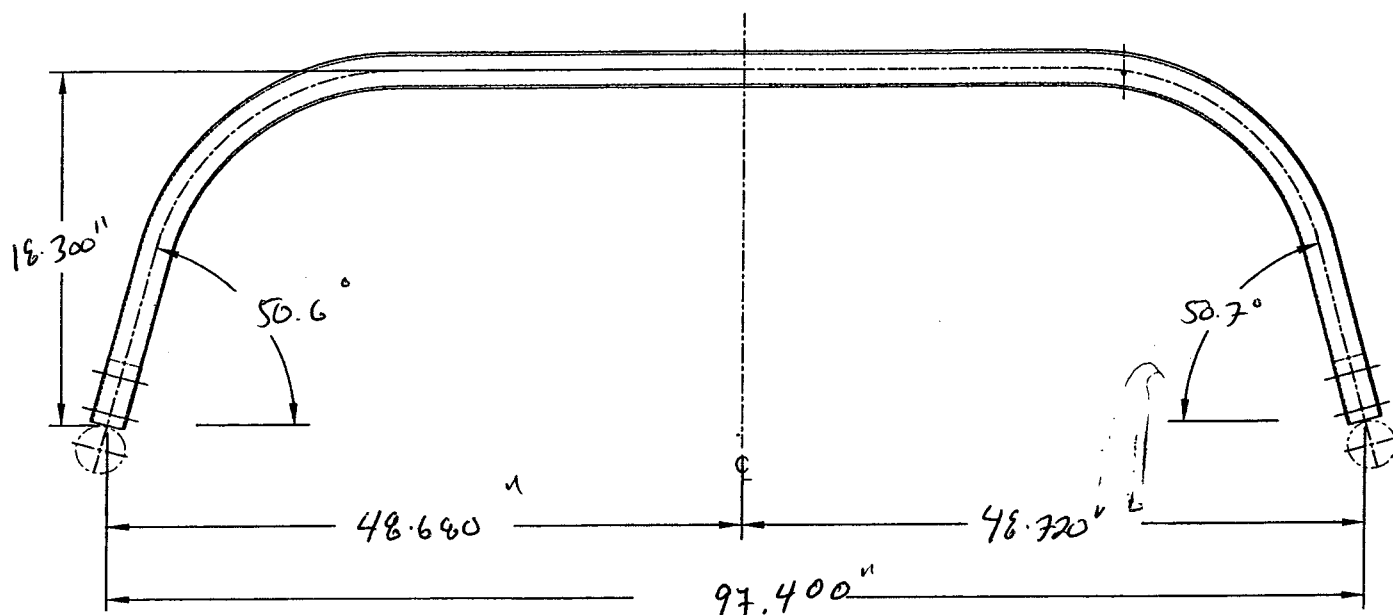
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b> 62841
<b>Description:</b> Crosstube Low Aft (205/212)		<b>Part Number:</b> D212-664-207
<b>Inspection Dwg:</b> D212-664-247	<b>Rev:</b> B	<b>Page 1 of 1</b>

Required Dimension	Min	Max
Height	18.16	18.42
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62



Comments

QC15 Inspection	8
Date	10/10/12

Rev	Date	Change	Revised by	Approved
A	08.02.29	New Issue	KJ/JM	
B	10.04.01	Dwg Rev updated	KJ	



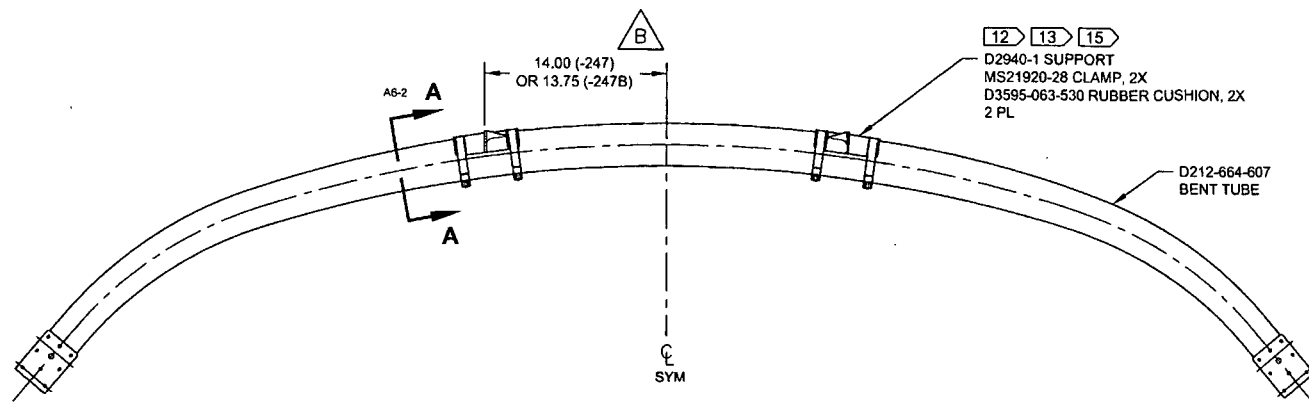
Item	Qty -247	Qty -247B	Part Number	Description
1	X		D212-664-247	CROSSTUBE ASSEMBLY (205/212 LOW AFT)
2		X	D212-664-247B	CROSSTUBE ASSEMBLY (214 LOW AFT)
3	1	1	D6008-132	CROSSTUBE
4	2	2	D2940-1	SUPPORT
5	4	4	D3595-063-530	RUBBER CUSHION
6	2	2	D3660-1	CUFF
7	4	4	MS21920-28	CLAMP (OR MS21920-30)
8	44	44	CR3212-4-06	RIVET (OR M7885/3-4-06)
9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
10	A/R	A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

# **GENERAL NOTES:**

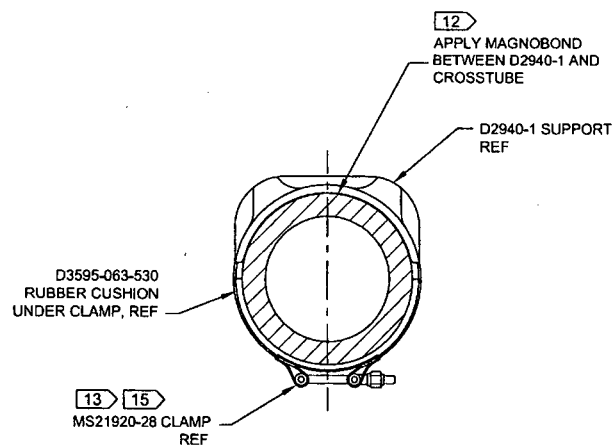
- MATERIAL: MANUFACTURED FROM D6008-132  
FINISHED LENGTH = 128.268±0.020 (BEFORE BENDING/TRIMMING)
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF  
USING VIBRATING STYLUS.
- WEIGHT: D212-664-247 = 36.6 lbs (PER IIN-D212-664)  
D212-664-247B = 36.6 lbs (PER IIN-D212-664)
- PART IS SYMMETRIC ABOUT CENTERLINE.
- WHEN MACHINING TAPER, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD  
BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6%  
BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF  
D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER  
INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-28 CLAMPS (OR -30) WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE D2940-1  
SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE  
SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS.  
DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE  
UNACCEPTABLE.
- TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS  
NOT BOTTOMED-OUT AFTER TORQUING.
- INSTALL D3660-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF  
SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE.  
SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

B	REVISE GENERAL NOTES/PART LIST; UPDATE TO CURRENT STANDARDS; ADD -247B (ZN C4-2, D5-2)	RF	09.09.30
A	NEW ISSUE	CP	07.07.07
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV. B
MFG. APPR.	RF	D212-664-247	SHEET 1 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (205/212 LOW AFT)	NTS
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2009-10-29



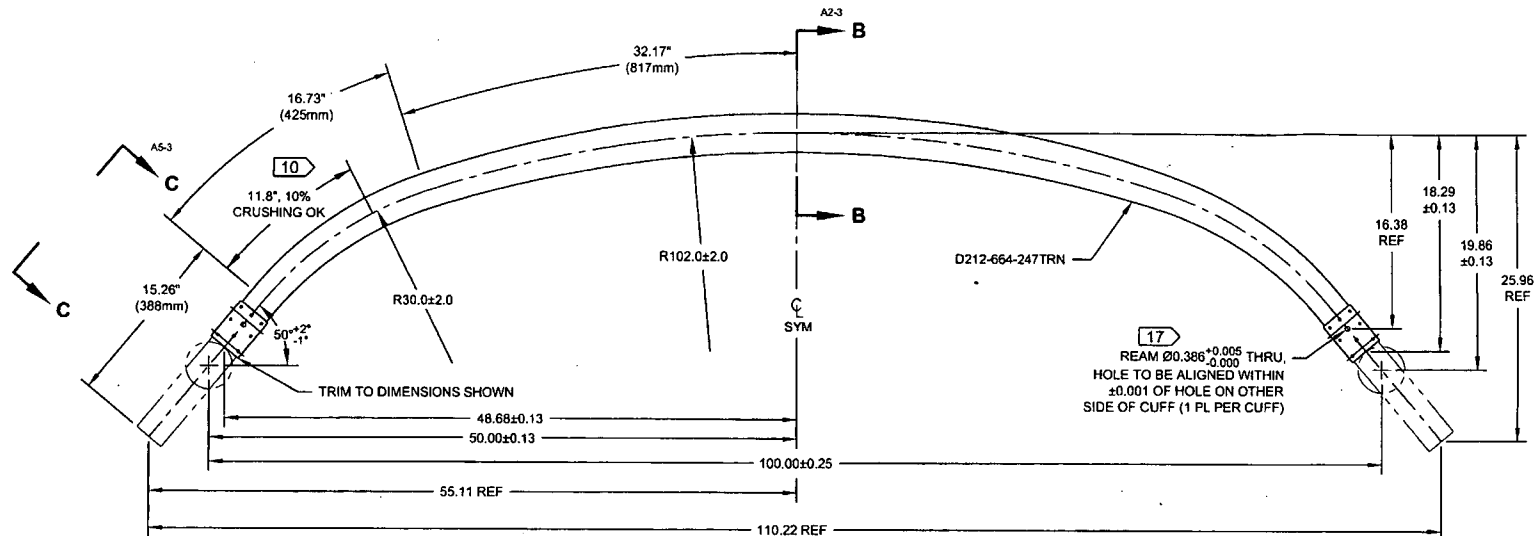
**D212-664-247/-247B  
ASSEMBLY DETAIL** B



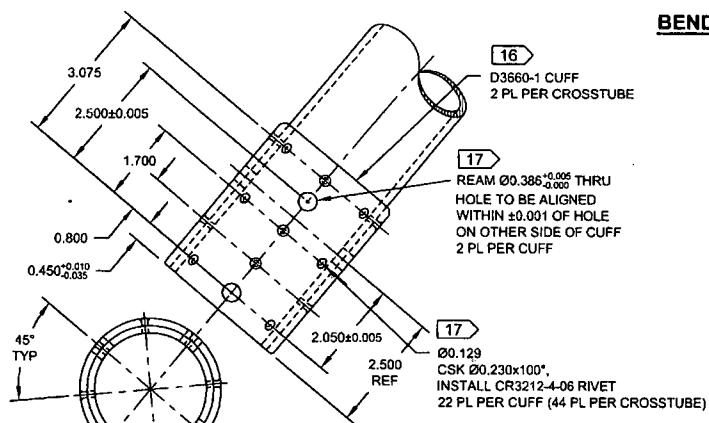
**SECTION A-A** D6-2  
SCALE 4X

DESIGN	98	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	98	DRAWING NO.	REV. B
MFG. APPR.	98	D212-664-247	SHEET 2 OF 4
APPROVED	98	TITLE	SCALE
DE APPR.	98	CROSSTUBE (205/212 LOW AFT)	NTS
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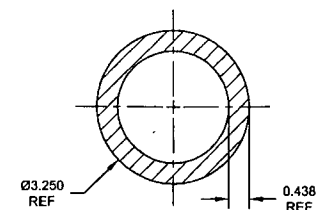
**RELEASED**  
2009-10-29



**D212-664-607**  
**BENDING AND DRILLING DETAIL**



**VIEW C-C: CUFF DETAIL** 07-3  
SCALE 4X

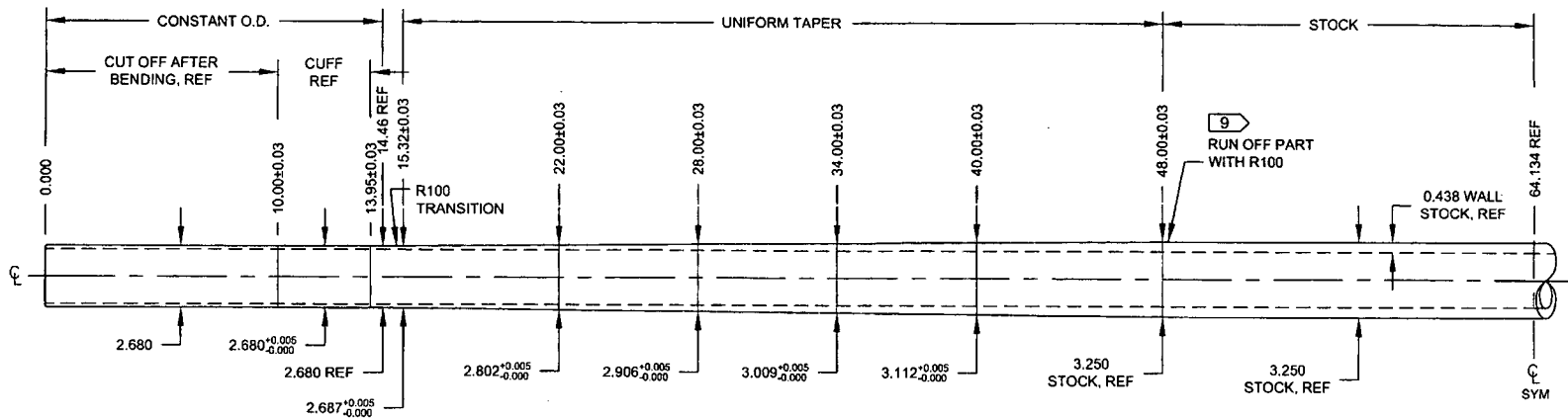


**SECTION B-B** 04-3  
SCALE 4X

**RELEASED**  
2009-10-29

DESIGN	<i>RF</i>	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>RF</i>	DRAWING NO.	REV. E
MFG. APPR.	<i>RF</i>	D212-664-247	SHEET 3 OF 4
APPROVED	<i>RF</i>	TITLE	SCALE
DE APPR.	<i>RF</i>	CROSSTUBE (205/212 LOW ALT)	NTS
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8 7 6 5 4 3 2 1



**D212-664-247TRN**  
**TURNING DETAIL**

**RELEASED**  
2009-10-29

DESIGN	RF	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV. B
MFG. APPR.	RF	D212-664-247	SHEET 4 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSS-SECTION (205/212 LOW AFT)	NTS
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# LIQUID PENETRANT TEST REPORT

P- 15196

CLIENT DART AEROSPACE DATE OCT-14-2010 TIME AM ☒ PM ☐  
ATTENTION LINDA / CHANTEL ACUREN JOB NO. 188-10-0918  
ADDRESS 1270 ABEL DEEN ST. PO/WO NO. —  
HAWKESBURY, ON. WORK LOCATION HAWKESBURY  
PROJECT F. P. I. ON CROSS TUBES ACCEPTANCE STD. ASTM 1417 REV./DATE 2005  
ITEM(S) EXAMINED (4)

JOB DESCRIPTION — PROCEDURE NO. LT-0002 REV./DATE 2008 TECHNIQUE NO. LT-1542 REV./DATE 2008  
PART NO. — MATERIAL ALUMINUM THICKNESS —  
SCOPE WET FLUORESCENT LIQUID PENETRANT CARRIED  
OUT ON 100% EXTERNAL SURFACE

TEST DETAILS  
METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED  
FAMILY BRAND MAGNAFLUX BLACK LIGHT S/N 16459 ☐ OUTPUT > 1000  $\mu$ W/cm<sup>2</sup> ☐ AMBIENT < 2 fc  
PENETRANT ZL67 MINIMUM DWELL TIME 45 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE  
PENETRANT REMOVER H2O MINIMUM DRY TIME >10 MIN. OTHER —  
DEVELOPER JK052 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N 1098866 CAL DUE DATE OCT-19-2010  
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE  
SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☒ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL  
SURFACE TEMPERATURE ☐ < -4°C/ 20°F ☐ -4°C/ 20°F TO 10°C/50°F ☐ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- (☐ METRIC ☐ IMPERIAL)

1 CROSS TUBE - W.O. 61739. ✓	PT 1070-15
1 CROSS TUBE - W.O. 61738 ✓	
1 CROSS TUBE - W.O. 62179. ✓	
1 CROSS TUBE - W.O. 62841 ✓	

Scope of Services  
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care  
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES  
CLIENT REPRESENTATIVE Ian Citley SIGNATURE [Signature] DTR # E 63396  
TECHNICIAN (SIGNATURE): [Signature] REPORT REVIEWED BY:  
NAME (PRINT): MIKE J. HANSTON NAME INITIALS  
CGSB LEVEL 1<sup>st</sup> SNT LEVEL — CGSB LEVEL — SNT LEVEL —  
CGSB REG. NO. 6666 CGSB REG. NO. —



# Work Order ID 62841

October 12, 2010 7:22:17 AM

Item ID: D212-664-207

Accept

Setup Start

Revision ID:

Stop

Item Name: Crosstube Low Standard Aft

Start Date: 10/13/10 Start Qty: 1.00

Cust Item ID:

Required Date: 10/22/10 Req'd Qty: 1.00

Customer:

Reference:

Run Start

Approvals:

Process Plan:

Date:

Tooling:

Date:

Stop

QC:

Date:

SPC (Y/N):

Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
<b>Draw Nbr</b> D212-664-247	<b>Revision Nbr</b> Rev B								
100	DOCUMENT CONTROL	0.00							
DC	Memo	0.00							
Document Control	Photocopy bluefile and create labels as per PPP D212-664-207 CHG001								
110	Pick Kit	0.00							
Packaging	Packaging	0.00							
Packaging	Memo								
120	BENDING MACHINE - CROSSTUBES	0.00							
CNC Bend 2	Memo	0.00							
CNC Alpha 160 Bender	Bend tube as per Dwg D212-664-247 using CNC bender program and Folio FT								

10-11-08

EL 10-10-12

EL 10-10-12

P10



REFERENCE ONLY

DART AEROSPACE LTD.

IIN-D212-664

Page 19 of 20

## 5.2 STANDARD GEAR CROSSTUBES

Item	-107	-207	-209	Part Number	Description
	X			D212-664-107	CROSSTUBE INSTALLATION, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD FWD
		X		D212-664-207	CROSSTUBE INSTALLATION, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD AFT
			X	D412-664-209	CROSSTUBE INSTALLATION, 412 STANDARD AFT
6	1			D212-664-147	CROSSTUBE ASSEMBLY, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD FWD
7		1		D212-664-247	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD AFT
8			1	D412-664-249	CROSSTUBE ASSEMBLY, 412 STANDARD AFT
10	2			* D2893-1	SUPPORT
11	4			* D3595-063-450	RUBBER CUSHION
12	4			* MS21920-25	CLAMP (OR MS21042-26)
13	4			AN6-35A	BOLT
14	4			AN6-36A	BOLT
15	6			MS21042L6	NUT (OR MS21042-6)
16	18			AN960JD616	WASHER
20		2		* D2940-1	SUPPORT
21		4		* D3595-063-530	RUBBER CUSHION
22		4		* MS21920-28	CLAMP (OR MS21042-30)
23		4		AN6-40A	BOLT
24		2		AN6-41A	BOLT
25		6		MS21042L6	NUT (OR MS21042-6)
26		18		AN960JD616	WASHER
30			1	* D2896-1	SUPPORT
31			2	* D2856-600-1009	ABRASION STRIP
32			2	* D3595-063-570	RUBBER CUSHION
33			4	* MS21920-28	CLAMP
34			2	* MS21920-30	CLAMP (OR MS21042-32)
35			4	AN6-40A	BOLT
36			2	AN6-41A	BOLT
37			6	MS21042L6	NUT (OR MS21042-6)
38			18	AN960JD616	WASHER
39			2	* D3189-1	CHAFING SHIELD
45	2			* D3659-1	CUFF
46		2	2	* D3660-1	CUFF
47	44	44		* CR3212-4-06	RIVET (M7885/3-4-06)
48			44	* CR3212-4-07	RIVET (M7885/3-4-07)
50	1	1		D3428-1	PLACARD

\*REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-147/-247 OR D412-664-249 ASSEMBLIES ABOVE  
NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AA SKIDTUBES.

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Revision: F  
Date: 08.09.05